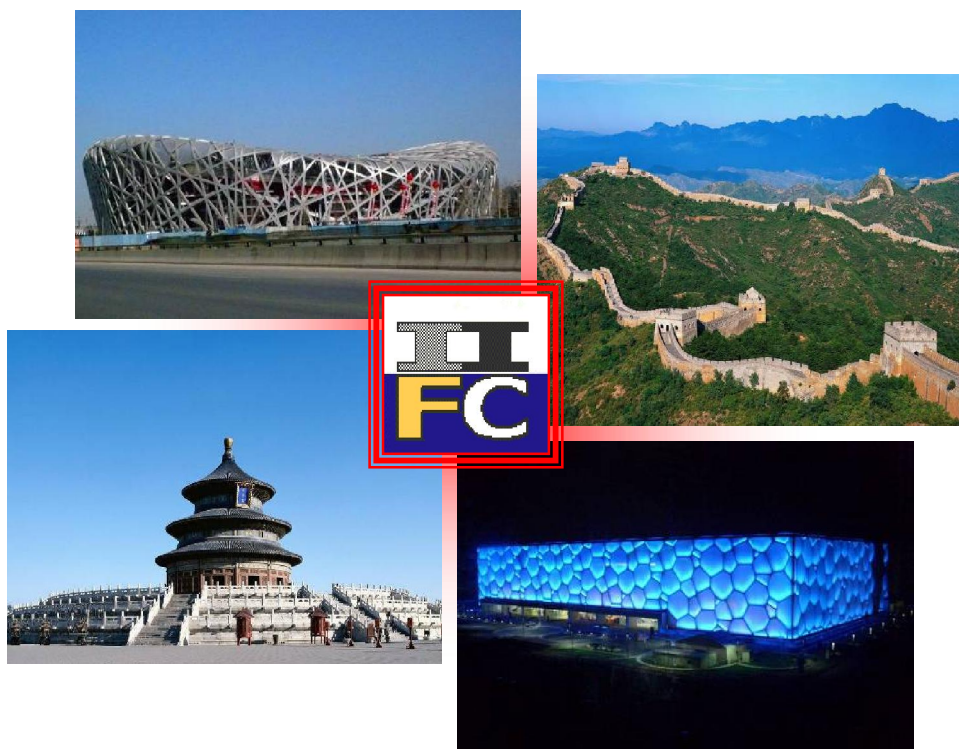




## **The 5th International Conference on Composites in Civil Engineering**



**September 27-29, 2010  
Beijing Friendship Hotel  
Beijing, China**

## *Organized by*



清华大学

Tsinghua University

**Tsinghua University**



中国冶金科工集团有限公司  
CHINA METALLURGICAL GROUP CORPORATION

中国冶金科工股份有限公司  
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**International Institute for FRP  
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中国土木工程学会

CHINA CIVIL ENGINEERING SOCIETY

**China Civil Engineering Society**



**National Natural Science  
Foundation of China**



**China Composites Industry Association**



**The Chinese Ceramic Society**



**Nanjing Hitech Composites Co., Ltd**

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## *CICE 2010 Secretariat*

*Peng Feng*

*Associate Professor, Department of Civil Engineering, Tsinghua University*

*Beijing, 100084, China*

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## ***Welcome to CICE 2010***

Applications of fiber reinforced polymer (FRP) composites in civil engineering have increased significantly in the past two decades. As FRPs are non-corrosive, high-strength and lightweight, their use in civil infrastructure has extended from the strengthening of existing structures to new construction. FRP therefore has wide application prospects in civil engineering. The Fifth International Conference on Composites in Civil Engineering, CICE 2010 ([www.cice2010.net](http://www.cice2010.net)) is held in Beijing on 27-29 September 2010. CICE 2010 is organized by the Department of Civil Engineering, Tsinghua University and China Metallurgical Group Corporation. It is the official conference of the International Institute for FRP in Construction, IIFC ([www.iifc-hq.org](http://www.iifc-hq.org)). The aim of this conference is to provide an international forum for all concerned with the application of FRP composites in civil engineering to exchange and share recent advances in both research and practice. The CICE conference series started with CICE 2001 ([www.cse.polyu.edu.hk/cice](http://www.cse.polyu.edu.hk/cice)) in Hong Kong, initiated by Professor Jin-Guang Teng. The next conference in the series, CICE 2004 ([www.adelaide.edu.au/cice2004](http://www.adelaide.edu.au/cice2004)) was chaired by Dr Rudi Seracino, held in Adelaide, Australia, in December 2004, followed by CICE 2006 ([www.iifc-hq.org/cice2006](http://www.iifc-hq.org/cice2006)) chaired by Professors Amir Mirmiran and Antonio Nanni, held in Miami, USA, in December 2006, and CICE 2008 ([www.cice2008.org](http://www.cice2008.org)) chaired by Professor Masoud Motavalli, held in Zurich, Switzerland, in July 2008.

This conference is also sponsored by the China Civil Engineering Society (CCES) and its FRP and Application Committee, the National Natural Science Foundation of China (NSFC), the China Composites Industry Association (CCIA), and the Chinese Ceramic Society FRP Committee.

A total of 203 papers and 10 keynotes are being presented in the following topics:

- FRP Materials and Sustainability
- All FRP Structures
- FRP Hybrid Structures and Concrete-Filled FRP Tubes
- Smart FRP Structures
- Concrete Structures Reinforced or Prestressed with FRP
- Long-Term Performance
- Fire, Impact and Blast Loading
- Education
- Applications and Design Guidelines
- Bond and Interfacial Stresses between FRP and Concrete
- Confinement of Concrete by FRP in Compression
- Flexural Strengthening of Concrete Beams and Slabs
- Shear Strengthening of Concrete Beams
- Strengthening of Concrete Columns, Walls and Frames
- Strengthening of Steel Structures
- Strengthening of Masonry and Timber Structures.

The papers are authored by experts in the field from 30 different countries around the world, including Argentina, Australia, Belgium, Brazil, Canada, China, Czech Republic, Egypt, France,

Germany, Greece, India, Iran, Iraq, Italy, Japan, Korea, Lithuania, Malaysia, Netherlands, Pakistan, Poland, Portugal, Singapore, Spain, Switzerland, Thailand, Turkey, UK, and USA. The technical papers not only address analytical and experimental work, but also cover field applications, and design and construction guidelines. Comparing the papers in this conference with those published in the early CICE conferences, it is clear that we have paid more attention to FRP for new structures, new applications, and long-term behaviors.

The valuable articles in the conference would not be presented without the help, dedication, and collaboration of numerous individuals. First and foremost, we thank the authors for meeting our various submittal deadlines, allowing this document to represent the most current work on the subjects from around the world. We would also like to thank the Organizing Committee and the International Scientific Committee of the conference for their relentless efforts in making this conference to happen. It is also important to thank the Executive Committee and the Council of IIFC for their support throughout this process.

We extend our heartiest welcome to the conference participants coming from many near and far parts of the world.

Lieping Ye  
Qingrui Yue  
CICE 2010 Conference Chairs

Peng Feng  
CICE 2010 Conference General Secretary

September 26, 2010

## ***Message from the President of IIFC***

Recent years have seen rapidly growing interest in the application of fibre-reinforced polymer (FRP) composites in construction around the world, in terms of both research activities and practical implementations. Indeed, FRP composites are being hailed as a new generation of construction materials, following steel and concrete. Against this background, the International Institute for FRP in Construction (IIFC) was formed in 2003 to promote and coordinate world-wide activities in this area. One of the important activities of IIFC is the organization of a biennial official conference series, as well as biennial regional conferences.

As President of IIFC, I would like to take this opportunity to express my sincere appreciation to Professor Lieping Ye, Chair of CICE 2010, and his team for devoting so much time and energy to make this conference a great success. I would also like to thank all others who contributed to this success in different ways, including members of the Organizing Committee, the International Advisory Committee and many others. The strong support for CICE 2010 shown by the international civil engineering FRP research community is a testimony to the importance and significance of this conference.

There is no doubt that a major impact of IIFC has been the sponsorship of international symposia and conferences. This will continue with this CICE conference and the 6<sup>th</sup> CICE conference scheduled for 2012 in Rome. Registration fees at such conferences imply that IIFC dues are waived for the year in question. Other advantages of IIFC membership are the *FRP International* newsletter, complimentary copies of conference proceedings, and participation in various working groups. We are striving to enhance the benefits of IIFC membership, and are Opening to all suggestions and ideas for doing so. I would like to conclude with a request to all members of the Institute: please inform your colleagues of the activities of IIFC and encourage them to join our vibrant organization.

Kenneth W. Neale  
President IIFC

September 26, 2010

# **The 5<sup>th</sup> International Conference on Composites in Civil Engineering (CICE 2010)**

September 27-29 2010  
Beijing Friendship Hotel, Beijing, China

**Organized by**  
Tsinghua University  
and  
China Metallurgical Group Corporation

**Sponsored by**  
International Institute for FRP in Construction (IIFC)  
China Civil Engineering Society (CCES)  
National Natural Science Foundation of China (NSFC)  
China Composites Industry Association (CCIA)  
The Chinese Ceramic Society FRP Committee

## **Conference Chairs**

Lieping Ye	Tsinghua University	Beijing, China
Qingrui Yue	China Metallurgical Group Corporation	Beijing, China

## **General Secretary**

Peng Feng	Tsinghua University	Beijing, China
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G. Wu	(Southeast University, China)
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Y.X. Yang	(China Metallurgical Group Corporation, China)

<b>CICE2010 Conference Program at a Glance - September 26-27</b>			
<i>Day</i>	<i>Time</i>	<i>Event</i>	<i>Location</i>
<b>26th</b>	<b>12:00-22:00</b>	<b>Registration</b>	<b>Lobby of Friendship Hotel Gui Bin Lou (Building 1)</b>
	<b>18:30-21:00</b>	<b>Welcome Reception</b>	<b>Dinning Hall of Gui Bin Lou (Building 1)</b>
<b>27th</b>	<b>8:00-18:00</b>	<b>Registration</b>	<b>Lobby of Friendship Hotel Gui Bin Lou (Building 1)</b>
	<b>8:00-8:30</b>	<b>Opening Ceremony</b>	<b>2nd Floor, Rui Bin Lou (Building 7)</b>
	<b>8:30-9:30</b>	<b>Keynote Lectures</b> 1: Thanasis Triantafillou 2: Yongdong Xiao	
	<b>9:30-9:50</b>	<b>NANJING HITECH Tea Break</b>	
	<b>9:50-10:50</b>	<b>Keynote Lectures</b> 3: Hui Li 4: Lawrence C. Bank	
	<b>10:50-12:20</b>	<b>IIFC General Meeting</b>	
	<b>12:30-13:30</b>	<b>Luncheons</b>	<b>Ju He Yuan, Friendship Palace</b>
	<b>13:30-15:15</b>	<b>Session 1</b>	<b>1st Floor, Jia Bin Lou (Building 8)</b>
		1A: All FRP Structures Room A 1B: Bond and Interfacial Stresses between FRP and Concrete Room B 1C: Strengthening of Steel Structures Room C 1D: Strengthening of Concrete Columns, Walls and Frames Room D	
	<b>15:15-15:30</b>	<b>NANJING HITECH Tea Break</b>	<b>1st Floor, Jia Bin Lou (Building 8)</b>
	<b>15:30-17:15</b>	<b>Session 2</b>	
		2A: All FRP Structures Room A 2B: Shear Strengthening of Concrete Beams Room B 2C: Strengthening of Steel Structures Room C 2D: Confinement of Concrete by FRP in Compression Room D	
	<b>17:30-19:00</b>	<b>IIFC Council Meeting</b>	<b>Room C 1st Floor, Jia Bin Lou (Building 8)</b>
	<b>18:30</b>	<b>Supper</b>	<b>Ju He Yuan, Friendship Palace</b>
	<b>19:30-20:30</b>	<b>fib TG9.3 Meeting</b>	<b>Room C 1st Floor, Jia Bin Lou (Building 8)</b>
	<b>20:30-21:30</b>	<b>CCES FRP and Application Committee Meeting</b>	<b>Room C 1st Floor, Jia Bin Lou (Building 8)</b>

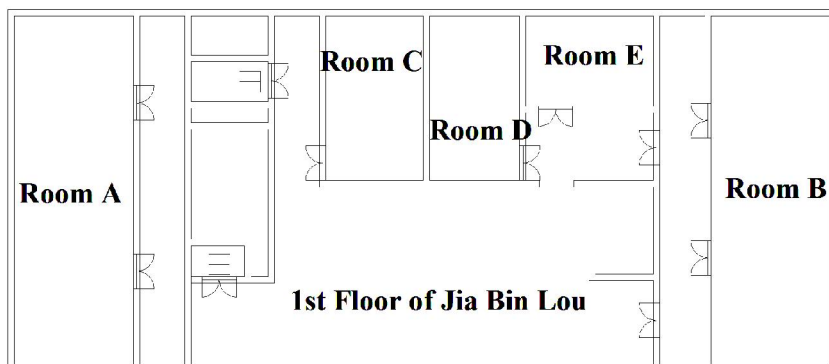


## CICE2010 Conference Program at a Glance - September 28

<i>Day</i>	<i>Time</i>	<i>Event</i>	<i>Location</i>
28th	8:00-9:30	<b>Keynote Lectures</b> 5: Charles E. Bakis 6 : Jin-Guang Teng 7 : Thomas Keller	2nd Floor, Rui Bin Lou (Building 7)
	9:30-9:50	<b>NANJING HITECH Tea Break</b>	1st Floor, Jia Bin Lou (Building 8)
	9:50-11:35	<b>Session 3</b>	
		3A: FRP Materials and Sustainability	Room A
		3B: Fire, Impact and Blast Loading	Room B
		3C: Long-Term Performance	Room C
		3D: Confinement of Concrete by FRP in Compression	Room D
	9:50-10:50	<b>Meeting of WG on FRP Structures</b>	Room E
	10:50-11:50	<b>Meeting of WG on Metal Strengthening</b>	1st Floor, Jia Bin Lou (Building 8)
	11:40-13:30	<b>Luncheons</b>	
	12:30-13:30	<b>Meeting of WG on Bond</b>	Room B
			1st Floor, Jia Bin Lou (Building 8)
	12:30-13:30	<b>Meeting of WG on Education</b>	Room E
			1st Floor, Jia Bin Lou (Building 8)
	13:30-14:45	<b>Session 4</b>	1st Floor, Jia Bin Lou (Building 8)
		4A: All FRP Structures	Room A
		4B: Bond and Interfacial Stresses between FRP and Concrete	Room B
		4C: FRP Hybrid Structures and Concrete-Filled FRP Tubes	Room C
		4D: Confinement of Concrete by FRP in Compression	Room D
		4E: Education	Room E
	14:45-15:00	<b>NANJING HITECH Tea Break</b>	1st Floor, Jia Bin Lou (Building 8)
	15:00-16:15	<b>Session 5</b>	
		5A: All FRP Structures	Room A
		5B: Bond and Interfacial Stresses between FRP and Concrete	Room B
		5C: FRP Hybrid Structures and Concrete-Filled FRP Tubes	Room C
		5D: Flexural Strengthening of Concrete Beams and Slabs	Room D
		5E: Applications and Design Guidelines	Room E
	16:30-22:00	<b>Summer Palace Tour and Traditional Banquet</b>	<b>Ting Li Guan Restaurant, Summer Palace</b> (Taking bus up at Central Garden)

<b>CICE2010 Conference Program at a Glance - September 29</b>			
<i>Day</i>	<i>Time</i>	<i>Event</i>	<i>Location</i>
29th	8:00-9:30	Session 6	1st Floor, Jia Bin Lou (Building 8)
		6A: Concrete Structures Reinforced or Prestressed with FRP	Room A
		6B: Bond and Interfacial Stresses between FRP and Concrete	Room B
		6C: Strengthening of Steel, Masonry and Timber Structures	Room C
		6D: Flexural Strengthening of Concrete Beams and Slabs	Room D
		6E: Strengthening of Concrete Columns, Walls and Frames	Room E
	9:30-9:45	<b>NANJING HITECH Tea Break</b>	1st Floor, Jia Bin Lou (Building 8)
	9:45-11:30	Session 7	
		7A: Concrete Structures Reinforced or Prestressed with FRP	Room A
		7B: Smart FRP Structures`	Room B
		7C: Long-Term Performance	Room C
		7D: Flexural Strengthening of Concrete Beams and Slabs	Room D
	9:45-10:45	<b>ISHMII/IIFC TG Meeting on Heritage Structure</b>	Room E 1st Floor, Jia Bin Lou (Building 8)
	10:50-12:20	<b>IIFC Executive and Advisory Committee Meeting</b>	Room E 1st Floor, Jia Bin Lou (Building 8)
	11:30-13:30	<b>Luncheons</b>	Ju He Yuan, Friendship Palace
	13:30-15:00	<b>Keynote Lectures</b> 8: Deric J. Oehlers 9: Jian-Fei Chen 10: Scott T. Smith	2nd Floor, Rui Bin Lou (Building 7)
	15:00-16:00	<b>Award Presentations and Closing Ceremony</b>	
	16:00-20:00	<b>Technical Tour</b>	Beijing Olympic Park (Taking bus up at Central Garden)
	20:00	<b>Supper</b>	Ju He Yuan, Friendship Palace

### **Plan of 1st Floor of Jia Bin Lou (Building 8)**



# Monday September 27, 2010

## Conference Registration

Lobby of Friendship Hotel, Gui Bin Lou (Building 1)

8:00-18:00 Registration

## General Session

2nd Floor, Rui Bin Lou (Building 7)

8:00-8:30 Opening Ceremony

## Keynote Lectures

2nd Floor, Rui Bin Lou (Building 7)

Chairperson: *Jin-Guang Teng*

8:30-9:00 IIFC Medal Keynote Lecture 1: *Thanasis Triantafillou*  
Innovative Textile-Based Composites for Strengthening and Seismic  
Retrofitting of Concrete and Masonry Structures

9:00-9:30 Keynote Lecture 2 : *Yongdong Xiao*  
FRP Composites Industry of China in Fifty Years

9:30-9:50 **NANJING HITECH Tea Break**

## Keynote Lectures

2nd Floor, Rui Bin Lou (Building 7)

Chairperson: *Kenneth W. Neale*

9:50-10:20 Keynote Lecture 3: *Hui Li*  
FRP Reinforced Bridges

10:20-10:50 Keynote Lecture 4: *Lawrence C. Bank*  
A Perspective on the Past, Present and Future of Composites for  
Construction

## IIFC General Meeting

2nd Floor, Rui Bin Lou (Building 7)

10:50-12:20 IIFC General Meeting

## Luncheons

Ju He Yuan, Friendship Palace

12:30-13:30 Lunch Break

## Session 1A All FRP Structures

Room A, 1st Floor, Jia Bin Lou (Building 8)

Chairpersons: *Amir Fam and Lawrence C. Bank*

13:30-13:45 *Behzad D. Manshadi, Anastasios P. Vassilopoulos, Thomas Keller*  
Shear Buckling of GFRP Beam Webs

13:45-14:00 *Behzad D. Manshadi, Anastasios P. Vassilopoulos, Julia de Castro, Thomas Keller*

Shear Wrinkling of GFRP Webs in Cell-Core Sandwiches

14:00-14:15 *B. Zafari, J.T. Mottram*

Pin-Bearing Strengths for Design of Bolted Connections with Pultruded

	Structures
14:15-14:30	<i>Yujun Qi, Peng Feng, Lieping Ye</i> Test and Mechanical Model and Analysis of FRP Woven Web Structures
14:30-14:45	<i>Nguyen Duc Hai, Hiroshi Mutsuyoshi, Kensuke Shiroki, Tatsuya Ishihama</i> Development of an Effective Joining Method for a Pultruded Hybrid CFRP/GFRP Laminate
14:45-15:00	<i>Hiroshi Mutsuyoshi, Kensuke Shiroki, Nguyen Duc Hai, Tatsuya Ishihama</i> Composite Behavior of a Pultruded Hybrid CFRP/GFRP Beam with UFC Deck
15:00-15:15	<i>U. Meekum</i> Experimental Design on Multi Layers of LVL Fiber Reinforced Wood Composite using Bagasse as Core Structure
<b>Session 1B</b>	<b>Bond and Interfacial Stresses between FRP and Concrete</b>
	<b>Room B, 1st Floor, Jia Bin Lou (Building 8)</b>
Chairpersons:	<i>Scott Smith and Jin-Guang Teng</i>
13:30-13:45	<i>J.G. Teng, G.M. Chen, J.F. Chen</i> Effect of Load Distribution on IC Debonding in FRP-Plated RC Beams
13:45-14:00	<i>M.R. Eftekhari, D. Mostofinejad</i> Effect of Bar-Cutoff and Bend-Point Locations on Debonding Loads in RC Beams Strengthened with CFRP Plates
14:00-14:15	<i>X.Q. Li, J.F. Chen, Y. Lu</i> Meso-Scale Modelling of FRP-to-Concrete Bond Behaviour using LSDYNA
14:15-14:30	<i>Fengchen An, Shuangyin Cao, Jinlong Pan, Qian Ge</i> Investigation on the Fracture Behavior of FRP-Concrete Interface under Direct Shear
14:30-14:45	<i>Troy Eveslage, John Aidoo, William Bro, Kent A. Harries,</i> Towards a Standard Test Method for Assessing FRP-to-Concrete Bond Characteristics
14:45-15:00	<i>Q. Sami, E. Ferrier, L. Michel, A. Si-Larbi, P. Hamelin</i> Experimental Investigation of CF Anchorage System Used for Seismic Retrofitting of RC Columns
15:00-15:15	<i>Yail J. Kim, Kent A. Harries</i> Modeling of Steel Beams Strengthened with CFRP Strips including Bond-Slip Properties
<b>Session 1C</b>	<b>Strengthening of Steel Structures</b>
	<b>Room C, 1st Floor, Jia Bin Lou (Building 8)</b>
Chairpersons:	<i>Iwao Sasaki and Hong Zhu</i>
13:30-13:45	<i>Huawen Ye, Shizhong Qiang, Christian König, Robin Plum, Thomas Ummenhofer</i> Static Behavior of Tension Steel Plate Strengthened with Pre-Stressed CFRP Laminates
13:45-14:00	<i>Jun Deng</i> Fatigue Life Prediction of Steel Beams Strengthened with a Carbon Fibre Composite Plate

14:00-14:15	<i>Zhigang Xiao, Xiao-Ling Zhao, Lewei Tong</i> Tests on CFRP Repaired Welded Thin-Walled Cross-Beam Connections
14:15-14:30	<i>Tao Chen, Xianglin Gu, Xiao-Ling Zhao</i> Fatigue Behavior of CFRP Repaired Non-Load Carrying Cruciform Welded Joints
14:30-14:45	<i>Xiao-Ling Zhao, Phaon Phiphat</i> Tests on CFRP Strengthened Aluminium RHS Subject to End Bearing Force
14:45-15:00	<i>M.Z. Kabir, A.E. Seif</i> Lateral Torsional Buckling of Steel I-Beam Retrofitted using FRP Sheets: Analytical Solution and Optimization
15:00-15:15	<i>Sawulet. Bekey, Feng Peng, Ye Lieping</i> Experimental Study on Behavior of FRP Anti-Buckling Strengthening Steel Members

<b>Session 1D</b>	<b>Strengthening of Concrete Columns, Walls and Frames</b> <b>Room D, 1st Floor, Jia Bin Lou (Building 8)</b>
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Chairpersons:	<i>Maria Anna Polak and Yaping Peng</i>
13:30-13:45	<i>N. Kyoda, T. Yamakawa, K. Nakada, P. Javadi, A. Nagahama</i> Emergency Retrofit for Damaged RC Columns by Fiber Belts Prestressing and Plywoods
13:45-14:00	<i>T. Jirawattanasomkul, D. Anggawidjaja, T. Ueda</i> Seismic Retrofitting by FRP Jacketing and Prediction Method of Ultimate Deformation
14:00-14:15	<i>Z.Y. Wang, D.Y. Wang, S.A. Sheikh, J.T. Liu</i> Seismic Performance of FRP-Confined Circular RC Columns
14:15-14:30	<i>A. Napoli, B. Nunziata, R. Realfonzo</i> Cyclic Behavior of FRP Confined RC Rectangular Columns with High Aspect Ratio
14:30-14:45	<i>M. Asfa, D. Mostofinejad, N. Abdoli</i> Effect of FRP Strengthening on the Behavior of Shear Walls with Opening
14:45-15:00	<i>F. Danesh, B. Baradaran Noveiri</i> Flexural Behavior of Concrete Columns Strengthened with near Surface Mounted FRP Bars
15:00-15:15	<i>T. de C.C.S. de Fonseca, S.F. de Almeida, J.B. de Hanai</i> Beam-to-Column Connection in a Precast Concrete Frame Strengthened by NSM CFRP Strips

15:15-15:30	<b>NANJING HITECH Tea Break</b>
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<b>Session 2A</b>	<b>All FRP Structures</b> <b>Room A, 1st Floor, Jia Bin Lou (Building 8)</b>
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Chairpersons:	<i>Julio F. Davalos and Thomas Keller</i>
15:30-15:45	<i>Li Wan, Weiqing Liu, Hai Fang, Ding Zhou</i> Interlaminar Behavior of Paulownia Wood Sandwich Composites with Grooves

15:45-16:00	<i>Bo Zhu, Ding Zhou, Weiqing Liu</i> Analytical Study on Buckling Modes of Simply Supported Delaminated Composite Beams
16:00-16:15	<i>M.J. McCarthy, L.C. Bank</i> Sensitivity Studies on Local Flange Buckling Equations for Pultruded Beams and Columns
16:15-16:30	<i>Manalo, Thiru Aravinthan, Warnu Karunasena</i> Shear Behavior of Glue-Laminated Composite Sandwich Beams
16:30-16:45	<i>Giosuè Boscato, Salvatore Russo</i> GFRP Members in Free Vibrations Field, Dynamic Parameters of Profiles and 3D Structure
16:45-17:00	<i>Giosuè Boscato, Salvatore Russo</i> GFRP Structures Subjected to Dynamic Action

17:00-17:15

## **Session 2B Shear Strengthening of Concrete Beams**

**Room B, 1st Floor, Jia Bin Lou (Building 8)**

Chairpersons:	<i>Kent A. Harries and Monssef Drissi-Habti</i>
15:30-15:45	<i>Salvador Dias, Joaquim Barros</i> Influence of the Concrete Properties in the Effectiveness of the NSM CFRP Laminates for the Shear Strengthening of RC Beams
15:45-16:00	<i>Camillo Nuti, Silvia Santini, Lorena Sguerri</i> Experimental Tests on FRP Shear Retrofitted RC Beams
16:00-16:15	<i>K.C. Panda, S.V. Barai, S.K. Bhattacharyya</i> Influence of Transverse Steel on the Performance of RC T-Beams Strengthened in Shear with GFRP Strips
16:15-16:30	<i>M.S. Murphy, A. Belarbi, D. Kuchma</i> Shear Design Equations for Concrete Girders Strengthened with FRP
16:30-16:45	<i>Wolfgang Finckh, Konrad Zilch</i> Shear Capacity of Flexural Strengthened Reinforced Concrete Structures with CFRP Materials
16:45-17:00	<i>Vincenzo Bianco, J.A.O. Barros, Giorgio Monti</i> Mechanical Model to Simulate the NSM FRP Strips Shear Strength Contribution to RC Beams
17:00-17:15	<i>Levingshan Augustus Nelson, Janet M. Lees</i> Size Effects in Reinforced Concrete Beams Strengthened with CFRP Straps
17:15-17:30	<i>Renata Kotynia</i> Efficiency of RC T-Section Beams Shear Strengthening with NSM FRP Reinforcement

## **Session 2C Strengthening of Steel Structures**

**Room C, 1st Floor, Jia Bin Lou (Building 8)**

Chairpersons:	<i>Xiao-Ling Zhao and Jun Deng</i>
15:30-15:45	<i>S.J. Kim, S.T. Smith, B. Young</i> Effect of Surface Preparation on the Strength of FRP-to-Mild Steel and FRP-to-Stainless Steel Joints

15:45-16:00	<i>J.G. Teng, D. Fernando, T. Yu, X.L. Zhao</i> Treatment of Steel Surfaces for Effective Adhesive Bonding
16:00-16:15	<i>Seishi Yamada, Krishna Kumar Bhetwal, Masayuki Yanagida, Yukihiro Matsumoto</i> Effects of FRP Reinforcements on the Buckling and Reduced Stiffness Criteria of Compressed Steel Cylinders
16:15-16:30	<i>Tien C. Nguyen, Yu Bai, Xiao-Ling Zhao, M.R Bambach, Riadh Al-Mahaidi</i> Temperature Effect on Adhesively Bonded CFRP and Steel Double Strap Joints
16:30-16:45	<i>Y. Hidekuma, A. Kobayashi, A. Tateishi, M. Nagai, T. Miyashita</i> Repairing Method for the Steel Members by CFRP Stranding Sheets
16:45-17:00	<i>Tim J. Stratford, Luke A. Bisby</i> Temperature Effects in Adhesively Bonded FRP Strengthening Applied to Steel Beams: Experimental Observations
17:00-17:15	<i>Chao Wu, Xiao-Ling Zhao, Riadh Al-Mahaidi, Wen Hui Duan</i> Experimental Study on Bond Behaviour between UHM CFRP Laminate and Steel

<b>Session 2D</b>	<b>Confinement of Concrete by FRP in Compression</b> <b>Room D, 1st Floor, Jia Bin Lou (Building 8)</b>
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Chairpersons:	<i>Yufei Wu and Tao Yu</i>
15:30-15:45	<i>S.Q. Li, J.F. Chen, L.A. Bisby, Y.M. Hu, J.G. Teng</i> Effect of Geometric Discontinuities on FRP Strain Efficiency in FRP-Confined Circular Concrete-Filled Steel Tubes
15:45-16:00	<i>Q.G. Xiao, J.G. Teng, T. Yu, L. Lam</i> Three-Dimensional Finite Element Model for FRP-Confined Circular Concrete Cylinders under Axial Compression
16:00-16:15	<i>A.R. Khan, N.S. Zafar</i> Compressive Strength of Concrete Cylinders Confined with CFRP Wraps
16:15-16:30	<i>Anupam Chakrabarti</i> Confinement Behaviour of Eccentrically Loaded RCC Columns using FRP Sheets
16:30-16:45	<i>B. Wan, C. Quon, L. Cheng</i> Concrete Column Confinement with Mechanism-Based Composite Bistable Structures
16:45-17:00	<i>E. Zile, V. Tamužs, M. Daugevičius</i> Mechanical Behavior of Concrete Columns Confined by Laterally Pre-Tensioned FRP
17:00-17:15	<i>Youyi Wei, Yufei Wu</i> Stress-Strain Modeling for Rectangular Concrete Columns Confined by FRP Jacket

<b>IIFC Council Meeting</b>	<b>Room C, 1st Floor, Jia Bin Lou (Building 8)</b>
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17:30-19:00 IIFC Council Meeting

**Supper**

**Ju He Yuan, Friendship Palace**

18:30 Supper

**fib TG9.3 Meeting**

**Room C, 1st Floor, Jia Bin Lou (Building 8)**

19:30-20:30 fib TG9.3 Meeting

**CCES FRP and Application Committee Meeting**

**Room B, 1st Floor, Jia Bin Lou (Building 8)**

20:30-21:30 CCES FRP and Application Committee Meeting



## Tuesday, September 28, 2010

### Keynote Lectures

**2nd Floor, Rui Bin Lou (Building 7)**

Chairpersons:	<i>Lawrence C. Bank</i>
8:00-8:30	Keynote Lecture 5: <i>Charles E. Bakis</i> Durability of GFRP Reinforcement Bars
8:30-9:00	Keynote Lecture 6 : <i>Jin-Guang Teng</i> Hybrid FRP-Concrete-Steel Double-Skin Tubular Structural Members
9:00-9:30	Keynote Lecture 7 : <i>Thomas Keller</i> Multifunctional and Robust Composite Material Structures for Sustainable Construction

9:30-9:50 **NANJING HITECH Tea Break**

**1st Floor, Jia Bin Lou (Building 8)**

### Session 3A FRP Materials and Sustainability

**Room A, 1st Floor, Jia Bin Lou (Building 8)**

Chairpersons:	<i>Patrice Hamelin and Guijun Xian</i>
9:50-10:05	<i>Qingxu Jin, Christopher K.Y. Leung</i> Fiber Reinforced Cementitious Composites (FRCC) Plate for the Anchoring of FRP Sheet on Concrete Member
10:05-10:20	<i>Gang Wu, W.J. Jing, Z.S. Wu</i> Study of Tensile Behavior for Interval Impregnated Hybrid Carbon/Basalt Fiber Sheet (C/BFS)
10:20-10:35	<i>Wenwei Wang, Wei Yang</i> Statistical Studies on Material Behavior of CFRP Sheets under Uniaxial Loads and Its Application in Reliability Analysis
10:35-10:50	<i>Jingyu Wu, Hui Li, Guijun Xian</i> Influence of Elevated Temperature on the Mechanical and Thermal Performance of BFRP Rebars
10:50-11:05	<i>Monsef Drissi-Habti, Xavier Chapeleau, Sébastien Cournée</i> Composite Desks and Sustainable Development: a Case Study
11:05-11:20	<i>Raphaël Contamine, Amir Si Larbi, Patrice Hamelin</i> Matrix and Fabric Impregnation Influence on Textile Reinforcement Concrete Behaviour
11:20-11:35	<i>N.L. Carey, J.J. Myers</i> Discrete Fiber Reinforced Polyurea for Hazard Mitigation

### Session 3B Fire, Impact and Blast Loading

**Room B, 1st Floor, Jia Bin Lou (Building 8)**

Chairpersons:	<i>Yu Bai and J.G. Dai</i>
9:50-10:05	<i>Anurag Jaipuriar, Jeffrey P. Flood, Charles E. Bakis, Maria M. Lopez, Xiongjun He</i>

	Glassy-Rubbery Transition Behavior of Epoxy Resins Used in FRP Structural Strengthening Systems
10:05-10:20	<i>A. Palmieri, S. Matthys, L. Taerwe</i>
	Fire Tests on RC Beams Strengthened with NSM
10:20-10:35	<i>Yu Bai, Thomas Keller, Erich Hugi, Carsten Ludwig</i>
	Fire Performance of Water-Cooled Cellular GFRP Columns
10:35-10:50	<i>K.H. Min, J.M. Yang, D.Y. Yoo, Y.S. Yoon</i>
	Flexural and Punching Performances of FRP and Fiber Reinforced Concrete on Impact Loading
10:50-11:05	<i>James H. Haido, Abu Bakar B.H., J. Jayaprakash, Ayad A. Abdul-Razzak</i>
	Nonlinear Response of Steel-Fiber Reinforced Concrete Beams under Blast Loading: Material Modeling and Simulation
11:05-11:20	<i>Giovanni P. Terrasi, Alex Stutz, Michel Barbezat, Luke A. Bisby</i>
	Fire Behavior of CFRP Prestressed High Strength Concrete Slabs
11:20-11:35	<i>J.G. Dai, W.Y. Gao, J.G. Teng</i>
	Finite Element Modeling of Insulated FRP-Strengthened RC Beams Exposed to Fire
<b>Session3C</b>	<b>Long-Term Performance</b>
<b>Room C, 1st Floor, Jia Bin Lou (Building 8)</b>	
Chairpersons:	<i>Ehab El-Salakawy and Yuanfeng Wang</i>
9:50-10:05	<i>Hao Zhou, Peiyan Huang, Zhengwei Li and Xiaohong Zheng, Jianhe Xie</i>
	Interfacial Crack Growth Behavior on RC Beams Strengthened with Prestressed CFL under Cyclic Bending Loads
10:05-10:20	<i>Peiyan Huang, Haiyang Wang, Hao Zhou, Xinyan Guo, Zhilin Zhou</i>
	Effects on the Fatigue Lives of RC Beams Strengthened with CFL at Elevated Temperature under Cyclic Bending Loads
10:20-10:35	<i>Pouya Zangeneh, Hamid Y. Omran, Raafat El-Hacha</i>
	Numerical Simulation of Prestressed CFRP Plate Strengthened Steel-Concrete Composite Girders
10:35-10:50	<i>E. Ferrier, A. Limam, P. Hamelin, M. Quiertant</i>
	Fatigue Loading Effect on RC Beams Strengthened with Externally Bonded FRP
10:50-11:05	<i>Urs Meier, Robert Müller, Michel Barbezat, Giovanni Pietro Terrasi</i>
	Box Girders under Extreme Long-Time Static and Fatigue Loading
11:05-11:20	<i>Yanchun Yun, Yufei Wu</i>
	Durability of CFRP Bonding Systems under Freeze-Thaw Cycling
11:20-11:35	<i>Yishuo Ma, Yuanfeng Wang</i>
	Parametric Analysis for Creep of High-Strength Concrete Columns Confined by AFRP
<b>Session3D</b>	<b>Confinement of Concrete by FRP in Compression</b>
<b>Room D, 1st Floor, Jia Bin Lou (Building 8)</b>	
Chairpersons:	<i>Tim J. Stratford and Q.G. Xiao</i>
9:50-10:05	<i>Dogan Akgun, Cem Demir, Alper Ilki</i>
	Axial Behavior of FRP Jacketed Extended Rectangular Members Constructed

	with Low Strength Concrete	
10:05-10:20	<i>Abdel Baky, Marc Demers, Abdallah Yahiaou, Kenneth Neale</i>	
	Nonlinear Micromechanics-Based Finite Element Analysis of FRP-Wrapped Concrete Columns Subjected to Axial Load	
10:20-10:35	<i>Luke A. Bisby, Tim J. Stratford</i>	
	The Ultimate Condition of FRP Confined Concrete Columns: New Experimental Observations and Insights	
10:35-10:50	<i>Mohammad A. Mashrik, Raafat El-Hacha, Khoa Tran</i>	
	Performance Evaluation of SFRP-Confined Circular Concrete Columns	
10:50-11:05	<i>Giorgio Monti, Nicola Nisticò, Valentino Lovo, Silvia Alessandri, Silvia Santini</i>	
	Procedure for the Statistical Determination of the Design FRP-Confined Concrete Strength	
11:05-11:20	<i>Nicola Nisticò, Giorgio Monti, Valentino Lovo</i>	
	Confined Circular and Square RC Sections: an Analytical Model for the Prediction of Ultimate Strength	
11:20-11:35	<i>A. Vatani Oskouei, M. Pirgholi Kivi, S. Taghipour Boroujeni</i>	
	Effect of CFRP and GFRP Confinement on Behavior of Square Lightweight Concrete Specimens	
<b>W1-F</b>		<b>Room E, 1st Floor, Jia Bin Lou (Building 8)</b>
9:50-10:50	Meeting of WG on FRP Structures	
<b>W2-M</b>		<b>Room E, 1st Floor, Jia Bin Lou (Building 8)</b>
10:50-11:50	Meeting of WG on Metal Strengthening	
<b>Luncheons</b>		<b>Ju He Yuan, Friendship Palace</b>
11:40-13:30	Lunch Break	
<b>W3-B</b>		<b>Room B, 1st Floor, Jia Bin Lou (Building 8)</b>
12:30-13:30	Meeting of WG on Bond	
<b>W4-E</b>		<b>Room E, 1st Floor, Jia Bin Lou (Building 8)</b>
12:30-13:30	Meeting of WG on Education	
<b>Session 4A</b>	<b>All FRP Structures</b>	<b>Room A, 1st Floor, Jia Bin Lou (Building 8)</b>
Chairpersons:	<i>An Chen and Hai Fang</i>	
13:30-13:15	<i>Julio F. Davalos, Avinash Vantaram, An Chen, Indrajit Ray, Jerry D. Plunkett</i>	
	Honeycomb Fiber-Reinforced Polymer Sandwich Panels for Fish Culture Tanks	
13:45-14:00	<i>Hitoshi Nakamura, Ken-ichi Maeda, Hiroshi Mutsuyoshi, Kenji Yaginuma, Takahiro Matsui</i>	
	Trial Design of Cable-Stayed Bridges using Hybrid Composite Girders and Applicability to Free Passage over Railway	
14:00-14:15	<i>Husham Almansour, Moe Cheung</i>	
	Performance Based Design of Laminated FRP Box Girder for Short Span Bridge	
14:15-14:30	<i>Benedict Leo, Anup Chakraborty, Amar Khennane</i>	

14:30-14:45	A Design Concept for an All Composite Road Bridge <i>Feifei Jin, Peng Feng, Lieping Ye</i> Study on Dynamic Characteristics of Light-Weight FRP Footbridges <i>Allan</i>
<b>Session 4B Bond and Interfacial Stresses between FRP and Concrete</b> <b>Room B, 1st Floor, Jia Bin Lou (Building 8)</b>	
Chairpersons:	<i>Shuangyin Cao and Renata Kotynia</i>
13:30-13:15	<i>V. Narayanamurthy, J.F. Chen, J. Cairns</i> A Rigorous Solution for Interfacial Stresses in Plated Beams
13:45-14:00	<i>Wolfgang Finckh, Konrad Zilch</i> Evaluation the Bond Behavior at the Intermediate Crack Element with a Special Test Procedure
14:00-14:15	<i>Ahmed Godat, Pierre Labossière, Kenneth W. Neale</i> Numerical Modeling of the FRP/Concrete Interfacial Behaviour of FRP Shear-Strengthened Beams
14:15-14:30	<i>J.G. Dai, Y.B. Cao</i> Debonding Behavior of Skew FRP-Bonded Concrete Joints
14:30-14:45	<i>L. Ding, S. Rizkalla, Gang Wu, Z.S. Wu</i> Bond Mechanism of Carbon Fiber Reinforced Polymer Grid in Concrete
<b>Session 4C FRP Hybrid Structures and Concrete-Filled FRP Tubes</b> <b>Room C, 1st Floor, Jia Bin Lou (Building 8)</b>	
Chairpersons:	<i>Weichen Xue and Baolin Wan</i>
13:30-13:15	<i>Yuqing Liu, Jun He, Haifeng Fan, Airon Chen, Liang Dai</i> Experimental study on Flexural Behaviour of Hybrid GFRP/ Concrete Bridge Deck
13:45-14:00	<i>Fei Zhao, Chaohe Chen, Wenjuan Lou, Peng Feng</i> Experimental Study of GFRP-Concrete Hybrid Beams
14:00-14:15	<i>Baoling Wan, C.M. Foley</i> In-Situ Load Tests and FE Modeling of Concrete Bridge with FRP Stay-In-Place Forms
14:15-14:30	<i>S.Y. Park, K. Cho, S.T. Kim, J.R. Cho, B.S. Kim</i> Structural Performance Evaluation of Precast FRP-Concrete Composite Deck with Concrete Wedge for Cable-Stayed Bridge
14:30-14:45	<i>Keunhee Cho, Sung Yong Park, Sung Tae Kim, Byung-Suk Kim</i> Static and Fatigue Behaviors of Precast FRP-Concrete Composite Deck for Cable-Stayed Bridge
<b>Session 4D Confinement of Concrete by FRP in Compression</b> <b>Room D, 1st Floor, Jia Bin Lou (Building 8)</b>	
Chairpersons:	<i>Alper Ilki and L. Lam</i>
13:30-13:15	<i>Hatem M. Seliem, Lining Ding, Sami Rizkalla</i> Confinement of Concrete Piles with FRP
13:45-14:00	<i>Craig A. Scheffers, R. Sri Ravindrarajah, Rhessa Reinaldy</i> Bearing Strength of CFRP Confined Concrete
14:00-14:15	<i>M. Hajisadeghi, F.J. Alaei</i> Numerical Analysis of Rectangular Reinforced Concrete Columns Confined

**批注 [Scott1]:** Can you please move this paper to session 3D (I will give this paper on behalf of the authors). With my IIFC activities on Day 1 and I will find it difficult to give the presentation in this section. Besides, if you move the Council meeting to 6pm then I will need to be there earlier to prepare.

14:15-14:30	with FRP Jacket under Eccentric Loading <i>Shahriar Quayyum, Ahmad Rteil</i>
14:30-14:45	Bond Strength of FRP Rebar to Concrete: Effect of Concrete Confinement <i>C. Israngkura Na Ayudhya, Y. Ungkoon</i>
	Bond Strength of Fiber Reinforced Polymer Bars in Autoclaved Aerated Concrete
<b>Session 4E</b>	<b>Education</b>
	<b>Room E, 1st Floor, Jia Bin Lou (Building 8)</b>
Chairpersons:	<i>Luke A. Bisby and Pierre Labossière</i>
13:30-13:15	<i>Luke A. Bisby</i>
	IIFC Educational Modules on Polymer Composites in Construction
13:45-14:00	<i>Pierre Labossière</i>
	Lessons Learned from a Design Competition for Structural Engineering Students: The Case of a Pedestrian Walkway at the Université de Sherbrooke
14:00-14:15	<i>Thiru Aravinthan</i>
	Challenges in the Design and Delivery of an Online Postgraduate Course in Fibre Composites
14:15-14:30	<i>Ferrier Emmanuel, Hamelin Patrice, Bigaud David</i>
	Virtual Practice with Computer Aided Software toward Better Understanding of RC Beams Strengthened by External Bonded FRP
14:30-14:45	<i>Peng Feng, Guijun Xian, Jinlong Pan</i>
	Course on FRP for Civil Engineering in Universities of China
14:45-15:00	<b>NANJING HITECH Tea Break</b>
<b>Session 5A</b>	<b>All FRP Structures</b>
	<b>Room A, 1st Floor, Jia Bin Lou (Building 8)</b>
Chairpersons:	<i>Salvatore Russo and Amar Khennane</i>
15:00-15:15	<i>Hale Mathieson, Amir Fam</i>
	GFRP-Polyurethane Sandwich Panels under Reversed Bending Fatigue
15:15-15:30	<i>Seigo Fujita, Ken-ichi Maeda, Hitoshi Nakamura, Nobuhiko Kitayama, Tetsuya Watanabe</i>
	Development and Experimental Verification of a Pedestrian Slab Bridge using GFRP Pultrusion Profiles
15:30-15:45	<i>Quan Zhou, Yan Xiao</i>
	Flexural Behavior of FRP Reinforced Glulam Beams
15:45-16:00	<i>Ziad K. Awad, Thiru Aravinthan, Yan Zhuge</i>
	Cost Optimum Design of Structural Fiber Composite Sandwich Panel For Flooring Applications
16:00-16:15	<i>Iwao Sasaki, Itaru Nishizaki</i>
	Load Bearing Properties of a FRP Bridge after Nine Years of Exposure
<b>Session 5B</b>	<b>Bond and Interfacial Stresses between FRP and Concrete</b>
	<b>Room B, 1st Floor, Jia Bin Lou (Building 8)</b>
Chairpersons:	<i>J.F. Chen and T. Ueda</i>

15:00-15:15	<i>A.R. Khan, Tehmina Ayub</i> Effectiveness of U-Shaped CFRP Wraps as End Anchorages in Predominant Flexure and Shear Region
15:15-15:30	<i>R. Sadone, M. Quiertant, S. Chataigner, J. Mercier, E. Ferrier</i> Behavior of an Innovative End-Anchored Externally Bonded CFRP Strengthening System under Low Cycle Fatigue
15:30-15:45	<i>Mohammad Zaman Kabir, Ata Hojatkashani</i> Examination of Interfacial Stresses due to Crack Propagation in FRP Retrofitted RC Beams
15:45-16:00	<i>D. Mostofinejad, M.J. Hajrasouliha</i> Experimental Study on Grooving Detail for Elimination of Debonding of FRP Sheets from Concrete Surface
16:00-16:15	<i>E. Martinelli, A. Napoli, R. Realfonzo</i> Interfacial Behavior between Mechanically Fastened FRP Laminates and Concrete Substrate
16:15-16:30	<i>Qilin Zhao, Fei Li, Haosen Chen</i> Analysis of Interfacial Bond Stress of FRP Tendon

<b>Session 5C</b>	<b>FRP Hybrid Structures and Concrete-Filled FRP Tubes</b> <b>Room C, 1st Floor, Jia Bin Lou (Building 8)</b>
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Chairpersons:	<i>Yongxin Yang and M.D.G. Pulido</i>
15:00-15:15	<i>Weichen Xue, Chang Ge, Yuan Tan, Yongsheng Wang</i> Experimental Studies on FRP-Concrete Composite Deck with FRP Perforated Shear Connectors
15:15-15:30	<i>Wonseok Chung, Hoon Jang, Zu-Og An</i> Numerical and Experimental Investigation of Concrete-Filled FRP Tube
15:30-15:45	<i>A.Chakraborty, A. Khennane, E.V. Morozov</i> An Experimental Investigation into the Behaviour of Filament Wound Hybrid FRP-Concrete Beam
15:45-16:00	<i>Hong Zhu, Pu Zhang, Gang Wu, Zhishen Wu</i> Experimental Study on Bending Performances of FRP-Concrete Composite T-Beams with Prefabricated BFRP Shell
16:00-16:15	<i>G.D. Woltman, D.G. Tomlinson, A. Fam</i> A Comparative Study of Various FRP Shear Connectors for Sandwich Concrete Walls

<b>Session 5D</b>	<b>Flexural Strengthening of Concrete Beams and Slabs</b> <b>Room D, 1st Floor, Jia Bin Lou (Building 8)</b>
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Chairpersons:	<i>Thanasis Triantafillou and Y.X. Zhang</i>
15:00-15:15	<i>Zongcai Deng, Rui Xiao</i> Flexural Performance of RC Beams Strengthened with Prestressed AFRP Sheets: Part II. Theoretical Analysis
15:15-15:30	<i>Liaqat A. Qureshi, Kamran A. Qureshi, Tahir Sultan, Jahangeer Munir</i> Comparison of Different Repairing Techniques Used for Rehabilitation of Initially Cracked RCC Beams
15:30-15:45	<i>Xin Zhang, Shibin Li, Liluan Yang, Xiangfei Kong</i>

	Analysis on Mechanical Behavior of RC Beams Strengthened with Inorganic Adhesive CFRP Sheets
15:45-16:00	<i>Wenwei Wang, Guofan Zhao, Chengkui Huang</i> Experimental Study of Concrete Beams Strengthened with CFRP Sheets under Simulating Vehicles Loads
16:00-16:15	<i>M.H. Oh, S.N. Hong, T.W. Kim, J. Cui, S.K. Park</i> Experimental Study on Deformation Recovery and Residual Strength of FRP RC Beams

<b>Session 5E</b>	<b>Applications and Design Guidelines</b>
	<b>Room E, 1st Floor, Jia Bin Lou (Building 8)</b>

Chairpersons:	<i>Stijn Matthys and Qingduo Hao</i>
15:00-15:15	<i>B.Wan, C.M. Foley</i> Structural Performance of Concrete Bridge Deck with Internal FRP Reinforcement
15:15-15:30	<i>An Chen, Julio F. Davalos</i> Guidelines for Design of Honeycomb FRP Sandwich Panels
15:30-15:45	<i>S.K. Savardekar, R. Jamaji, K. R. Raikar</i> Structural Remediation of Unreinforced Brick Masonry Walls of a Heritage Palace Building with Carbon Fibre Reinforced Polymers
15:45-16:00	<i>Dongming Yan, Chenglin Wu, Jianbo Li, Genda Chen</i> Inspection, Analysis and Loading Test of a Slab Bridge Strengthened with FRP Laminates
16:00-16:15	<i>Lim Boon Kok, Yang Ming Hui</i> Protection of Aged Cement Clinker Silo Against High Impact and High Temperature Discharge

<b>Traveling and Entertainment</b>	<b>Ting Li Guan Restaurant, Summer Palace</b> <i>(Taking Bus up: Central Garden of Hotel)</i>
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16:30-22:00	Summer Palace Tour and Traditional Banquet
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## Wednesday, September 29, 2010

### **Session 6A      Concrete Structures Reinforced or Prestressed with FRP** **Room A, 1st Floor, Jia Bin Lou (Building 8)**

- Chairpersons: *Raafat El-Hacha and Z.S. Wu*
- 8:00-8:15      *M. Baena, A. Turon, Ll. Torres, C. Miàs, C. Barris, G. Barbeta*  
Experimental Study on the Tension Stiffening Effect of GFRP RC Elements
- 8:15-8:30      *J.M. Yang, K.H. Min, H.O. Shin, Y.S. Yoon*  
Behavior of High-Strength Concrete Beams Reinforced with Different Types of Flexural Reinforcements and Fiber
- 8:30-8:45      *S. El-Gamal, B. AbdulRahman, B. Benmokrane*  
Deflection Behaviour of Concrete Beams Reinforced with Different Types of GFRP Bars
- 8:45-9:00      *C.Duhude, E. Ahmed, S. El-Gamal, B. Benmokrane*  
Testing of Large-Scale Two-Way Concrete Slabs Reinforced with GFRP Bars
- 9:00-9:15      *Wenhua Cai, Jiwen Zhang, Shuting Liang, Yongming Tu*  
Study of Static Load Tests of Bond-Type Anchors for CFRP Tendons
- 9:15-9:30      *Mohamed Mady, Mohamed Hasaballa, Amr El-Ragaby, Ehab El-Salakawy*  
Effect of Reinforcement Detailing on the Behaviour of GFRP-RC Beam-Column Joints

### **Session 6B      Bond and Interfacial Stresses between FRP and Concrete** **Room B, 1st Floor, Jia Bin Lou (Building 8)**

- Chairpersons: *D.J. Oehlers and Qilin Zhao*
- 8:00-8:15      *H.W. Zhang, S.T. Smith*  
FRP-to-Concrete Joint Assemblies Anchored with Multiple FRP Anchors: Experimental Investigation
- 8:15-8:30      *Fatemeh Sedigh Imani, An Chen, Julio F. Davalos, Indrajit Ray*  
Temperature and Water-Immersion Effect on Mode II Fracture Behavior of CFRP-Concrete Interface
- 8:30-8:45      *A.M. Mahmoud, H.H. Ammar, O.M. Mukdadi, I. Ray, F. Imani, A. Chen, J.F. Davalos*  
Ultrasonic Evaluation of CFRP-Concrete Interface for Specimens under Temperature and Water-Immersion Aging Effects
- 8:45-9:00      *Renata Kotynia*  
Modified Beam Bond Test on Externally Bonded and Near Surface Mounted FRP Strengthened RC Beams
- 9:00-9:15      *A.Palmieri, S. Matthys*  
Experimental Investigation on Bond of NSM Strengthened RC Structures

### **Session 6C      Strengthening of Steel, Masonry and Timber Structures** **Room C, 1st Floor, Jia Bin Lou (Building 8)**

- Chairpersons: *Giorgio Monti and Peiyan Huang*
- 8:00-8:15      *Xu Jiang, Henk Kolstein, Frans S.K. Bijlaard*



	Moisture Diffusion in FRP Adhesively-Bonded Joints under Hot/Wet Environments
8:15-8:30	<i>Juliana Alves, Amr El-Ragaby, Ehab El-Salakawy</i> Bond Strength of Glass FRP Bars in Concrete Subjected to Freeze-Thaw Cycles and Sustained Loads
8:30-8:45	<i>Itaru Nishizaki, Iwao Sasaki</i> Long-Term Durability of FRP Cables under Maritime Conditions
8:45-9:00	<i>C.S. Sirimanna, M.M. Islam, T. Aravinthan</i> Temperature Effects on Full Scale FRP Bridge using Innovative Composite Components
9:00-9:15	<i>Safeer Abbas, Ahmad Rteil</i> Modeling the Effect of Repeated Loading on the Behavior of CFRP Confined Bond of Corroded Reinforcement
9:15-9:30	<i>Bo Xiao, Hui Li, Guijun Xian</i> Hygrothermal Ageing of Basalt Fiber Reinforced Epoxy Composites

<b>Session 6D</b>	<b>Flexural Strengthening of Concrete Beams and Slabs</b>
	<b>Room D, 1st Floor, Jia Bin Lou (Building 8)</b>

Chairpersons:	<i>Ferrier Emmanuel and Wenwei Wang</i>
8:00-8:15	<i>J.F. Davalos, A. Chen, I. Ray, A. Justice</i> A Systematic Study of Rehabilitation of Reinforced Concrete T-Beam Structures using Externally Bonded FRP Composites
8:15-8:30	<i>A.Serbescu, M. Guadagnini, K. Pilakoutas, A. Palmieri, S. Matthys</i> Basalt FRP for Strengthening of RC Members
8:30-8:45	<i>Y. Kurihashi, N. Kishi, A.M. Ali, H. Mikami</i> Load-Carrying Capacity of Flexural Reinforced PC Beams with Pre-Tensioned AFRP Sheet
8:45-9:00	<i>Si Larbi Amir, Contamine Raphael, Ferrier Emmanuel, Hamelin Patrice</i> Flexural Strengthening of Reinforced Concrete Beams with Textile Reinforced Concrete (TRC)
9:00-9:15	<i>Hamid Y. Omran, Raafat El-Hacha</i> Finite Element Modeling of RC Beams Strengthened in Flexure with Prestressed NSM CFRP Strips
9:15-9:30	<i>Habib Akbarzadeh, A.A. Maghsoudi</i> Flexural Strengthening of RC Continuous Beams using Hybrid FRP Sheets

<b>Session 6E</b>	<b>Strengthening of Concrete Columns, Walls and Frames</b>
	<b>Room E, 1st Floor, Jia Bin Lou (Building 8)</b>

Chairpersons:	<i>R. Realfonzo and Z.Y. Wang</i>
8:00-8:15	<i>Mehdi Sarafraz, Fakhreddin Danesh</i> Use Near Surface Mounted FRP Rods for Flexural Retrofitting of RC Columns
8:15-8:30	<i>J.G. Teng, J.Y. Lu, L. Lam, Q.G. Xiao</i> Numerical Simulation of FRP-Jacketed RC Columns Subjected to Cyclic Loading
8:30-8:45	<i>S.S. Mahini, S.A. Hadigheh, M.R. Maheri</i>

	Seismic Assessment of FRP-Retrofitted RC Frames using Pushover Analysis Considering Strain Softening of Concrete
8:45-9:00	<i>Yaping Peng, Ming Ma, Guang Dong</i>
	Seismic Performance Analysis of FRP Reinforced Concrete Frame Structure
9:00-9:15	<i>Francesca Ceroni, Marisa Pecce, Fabio A. Bibbò</i>
	The Anchorage Behavior of FRP EBR in the Plastic Zone of RC Beams
9:15-9:30	<i>Maria Anna Polak, Nicholas Lawler</i>
	Application of FRP for Punching Shear Retrofit of Concrete Slab-Column Connections

9:30-9:45 **NANJING HITECH Tea Break**

**Session 7A Concrete Structures Reinforced or Prestressed with FRP**  
**Room A, 1st Floor, Jia Bin Lou (Building 8)**

Chairpersons:	<i>Riadh Al-Mahaidi and Mainul Islam</i>
9:45-10:00	<i>Haitang Zhu, Yakun Zhang, Danying Gao, Zhilong Xiao</i> Deformation Behavior of Concrete Two-Way Slabs Reinforced with BFRP Bars Subjected to Eccentric Loading
10:00-10:15	<i>Wenjie Ge, Jiwen Zhang, Hang Dai, Yongming Tu</i> Experimental Study on the Flexural Behavior of Concrete Beam Hybrid Reinforced with FRP Bars and Steel Bars
10:15-10:30	<i>Mohamed Hwash, Jan Knippers</i> Experiments According to ETAG to Determine Friction Effects on Deviated CFRP-Strips
10:30-10:45	<i>Mostafa El-Mogy, Amr El-Ragaby and Ehab El-Salakawy</i> Behaviour of Continuous Concrete Beams Reinforced with FRP Bars
10:45-11:00	<i>Matthew Sentry, Riadh Al-Mahaidi, Abdelmalek Bouazza, Len Carrigan</i> Bond Type Anchorage Systems for Permanent High Strength CFRP Ground Anchors
11:00-11:15	<i>Mohamed F.M. Fahmy, Z.S. Wu, G. Wu</i> Effect of Bond Parameters on Recoverability of RC Bridge Columns Reinforced with Ordinary Rebars and Steel Fiber Composite Bars
11:15-11:30	<i>Jianxun Ma, Xuemei Qiu, Litao Cheng, Yunlong Wang</i> Experimental Research on the Fundamental Mechanical Properties of Presoaked Basalt Fiber Concrete

**Session 7B Smart FRP Structures**  
**Room B, 1st Floor, Jia Bin Lou (Building 8)**

Chairpersons:	<i>Stefan Käseberg and Yanlei Wang</i>
9:45-10:00	<i>Xin Wang, Zhishen Wu</i> Effectiveness of Smart Damper for Hybrid FRP Cable in Long-Span Cable-Stayed Bridge
10:00-10:15	<i>Yanlei Wang, Qingduo Hao, Jinping Ou</i> A Smart FRP-Concrete Composite Beam using FBG Sensors
10:15-10:30	<i>Stefan Käseberg, Klaus Holschemacher</i>

10:30-10:45	Smart CFRP Systems - Fiber Bragg Gratings for Fiber Reinforced Polymers <i>Klaus Holschemacher, Stefan Käseberg</i>
10:45-11:00	Sensor CFRP-Sheets for the Controlled Strengthening and Retrofitting of Reinforced Concrete Members <i>Jianlin Luo, Hui Li, Guijun Xian</i>
11:00-11:15	Electrically Conductive Nanocomposite Coating for Strain and Health Monitoring <i>Monssef Drissi-Habti</i>
11:15-11:30	Smart Composites for Durable Infrastructures – Importance of Structural Health Monitoring (SHM) <i>Qingduo Hao, Yanlei Wang, Jinping Ou</i>
	Development Length of Glass Fiber Reinforced Plastic (GFRP)/Steel Wire Composite Rebar

<b>Session 7C</b>	<b>Long-Term Performance</b>	<b>Room C, 1st Floor, Jia Bin Lou (Building 8)</b>
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Chairpersons:	<i>Charles E. Bakis and D. Fernando</i>
9:45-10:00	<i>Asal Salih Oday, Yingmin Li, Mohammad Agha Houssam</i> Experimental Study on Seismic Behavior Before and After Retrofitting of Masonry Walls using FRP Laminates
10:00-10:15	<i>J. Witzany, T. Cejka, R. Zigler</i> Strengthening of Masonry Structures using FRP - Experimental Research
10:15-10:30	<i>M. Menegotto, G. Monti, S. Salvini, M. Vailati</i> Improvement of Transverse Connection of Masonry Walls through AFRP Bars
10:30-10:45	<i>J. Wan, S.T. Smith, P.Z. Qiao</i> FRP-to-Softwood Joints: Experimental Investigation
10:45-11:00	<i>C. Miàs, Ll. Torres, A. Turon, M. Baena, I. Vilanova, M. Llorens</i> Experimental Study of Time-Dependent Behaviour of Concrete Members Reinforced with GFRP Bars
11:00-11:15	<i>Gang Wu, Haiyang Liu, Zhishen Wu, Haitao Wang</i> Experimental Study on Fatigue Behavior of I-Steel Beam Strengthened with Different FRP Plates
11:15-11:30	<i>K. Benzarti, M. Quiertant, C. Marty, S. Chataigner, C. Aubagnac,</i> Effects of Accelerated Ageing on the Adhesive Bond between Concrete Specimens and External CFRP Reinforcements

<b>Session 7D</b>	<b>Flexural Strengthening of Concrete Beams and Slabs</b>	<b>Room D, 1st Floor, Jia Bin Lou (Building 8)</b>
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Chairpersons:	<i>Amir Si Larbi and N. Kishi</i>
9:45-10:00	<i>Matthew Anderson, Indrajit Ray, An Chen, Julio Davalos</i> A Study on the Applicability of ECE Technique on Chloride Contaminated Concrete Retrofitted with FRP Strips
10:00-10:15	<i>N. Kishi, M. Komuro, H. Mikami</i> Numerical Simulation on Flexural Reinforcing Effects of AFRP Sheet for Damaged RC Girders
10:15-10:30	<i>Xiaoshan Lin, Y.X. Zhang</i>

	Nonlinear Finite Element Analysis of Composite Steel/FRP-reinforced Concrete Beams using a New Beam Element
10:30-10:45	<i>Ted Donchev, Parviz Nabi</i>
	Non-Bolted Anchorage Systems for CFRP Laminates Applied for Strengthening of RC Slabs
10:45-11:00	<i>G Tharmarajah, Susan E. Taylor, Desmond Robinson, David J. Cleland</i>
	Arching Action in Laterally Restrained GFRP Reinforced Slabs
11:00-11:15	<i>I. Vilanova, C. Barris, Ll. Torres, C. Miàs, M. Baena, V.O. García</i>
	Comparative Study of Deflection Equations for FRP RC Beams
11:15-11:30	<i>M. A. Helal, Kh. M. Heiza</i>
	Effect of Fire and High Temperature on the Properties of Self Compacted Concrete
<b>H-Meeting</b>	
<b>Room E, 1st Floor, Jia Bin Lou (Building 8)</b>	
9:45-10:45	ISHMII/IIFC TG Meeting on Heritage Structure
<b>IIFC Executive and Advisory Committee Meeting</b>	
<b>Room E, 1st Floor, Jia Bin Lou (Building 8)</b>	
10:50-12:20	IIFC Executive and Advisory Committee Meeting
<b>Luncheons</b>	
<b>Ju He Yuan, Friendship Palace</b>	
11:30-13:30	Lunch Break
<b>Keynote Lectures</b>	
<b>2nd Floor, Rui Bin Lou (Building 7)</b>	
Chairperson:	<i>Thomas Keller</i>
13:30-14:00	Keynote Lecture 8 : <i>D.J. Oehlers</i> FRP Design Using Structural Mechanics Models
14:00-14:30	Keynote Lecture 9 : <i>J.F. Chen</i> Finite Element Modelling of FRP-to-Concrete Bond Behaviour Using the Concrete Damage Plasticity Theory Combined with a Plastic Degradation Model
14:30-15:00	IIFC Distinguished Young Researcher Keynote Lecture: <i>Scott T. Smith</i> Strengthening of Concrete, Metallic and Timber Construction Materials with FRP Composites
<b>Closure</b>	
<b>2nd Floor, Rui Bin Lou (Building 7)</b>	
15:00-16:00	Award Presentations and Closing Ceremony
<b>Technical Tour</b>	
<b>Beijing Olympic Park</b>	
<i>Taking Bus up: East Entrance of Hotel</i>	
16:00-20:00	Technical Tour To Beijing Olympic Park
<b>Supper</b>	
<b>Ju He Yuan, Friendship Palace</b>	
20:00	Supper

# Proceedings of the Fifth International Conference on FRP Composites in Civil Engineering

## Vol. I FRP for Future Structures

Edited by Lieping Ye, Peng Feng, and Qingrui Yue

### Keynote Papers

1. K01 Innovative Textile-based Composites for Strengthening and Seismic Retrofitting of Concrete and Masonry Structures
2. K02 Strengthening of Concrete, Metal and Timber with FRP Composites
3. K03 Multifunctional and robust composite material structures for sustainable construction
4. K04 Hybrid FRP-Concrete-Steel Double-Skin Tubular Structural Members
5. K05 Durability of GFRP Reinforcement Bars
6. K08 FRP Design Using Structural Mechanics Models
7. K09 Finite Element Modelling of FRP-to-Concrete Bond Behaviour Using the Concrete Damage Plasticity Theory Combined with a Plastic Degradation Model

### FRP Materials and Sustainability

1. 351 Fiber reinforced cementitious composites (FRCC) plate for the anchoring of FRP sheet on concrete member
2. 356 Study of Tensile Behavior for Interval Impregnated Hybrid Carbon/Basalt Fiber Sheet (C/BFS)
3. 026 Statistical studies on material behavior of CFRP sheets under uniaxial loads and its application in reliability analysis
4. 090 Comprehensive Characterization of BFRP Applied in Civil Engineering
5. 091 Influence of Elevated Temperature on the Mechanical and Thermal Performance of BFRP Rebars
6. 137 Composite Desks & Sustainable Development a Case Study
7. 190 Matrix and Fabric Impregnation Influence on Textile Reinforcement Concrete Behaviour
8. 146 Discrete Fiber Reinforced Polyurea for Hazard Mitigation
9. 310 Experimental Research on the Fundamental Mechanical Properties of Presoaked Basalt Fiber Concrete

### All FRP Structures

1. 125 Shear Buckling of GFRP Beam Webs
2. 126 Shear Wrinkling of GFRP Webs in Cell-Core Sandwiches
3. 033 Pin-bearing Strengths for Design of Bolted Connections with Pultruded Structures
4. 133 Development of an effective joining method for a pultruded hybrid CFRP/GFRP composite laminate
5. 157 A Consistent Design Concept For Bolted Connections In Standardized GFRP-Profiles
6. 134 Composite behavior of a pultruded hybrid CFRP/GFRP girder with UFC deck
7. 210 Sensitivity Studies on Local Flange Buckling Equations for Pultruded Beams and Columns
8. 308 Analytical study on buckling modes of simply supported delaminated composite beams
9. 309 Interlaminar Behavior of Paulownia Wood Sandwich Composites with Grooves
10. 247 GFRP Structures Subjected to Dynamic Action
11. 248 GFRP members in free VIBRATIONS field, DYNAMIC PARAMETERS OF PROFILES and 3D STRUCTURE
12. 057 Experimental Design On Multi Layers Of LVL Fiber Reinforced Wood Composite Using Bagasse As Core Structure
13. 082 Shear behavior of glue-laminated composite sandwich beams
14. 095 Flexural behavior of FRP reinforced glulam beams
15. 085 Trial Design of Cable-Stayed Bridges Using Hybrid Composite Girders and Applicability to Free Passage over Railway
16. 256 Performance Based Design of Laminated FRP Box Girder for Short Span Bridge
17. 266 A design concept for an all composite road bridge

18. 321 Mechanical Model and Analysis of FRP Woven Web Structures
19. 204 GFRP-polyurethane sandwich panels under reversed bending fatigue
20. 083 Development and Experimental Verification of a Pedestrian Slab Bridge Using GFRP Pultrusion Profiles
21. 320 Study on Dynamic Characteristics of Light-weight FRP Footbridges
22. 160 Honeycomb Fiber-Reinforced Polymer Sandwich Panels for Fish Culture Tanks

## FRP Hybrid Structures and Concrete-Filled FRP Tubes

1. 296 Hybrid FRP-Concrete Structural Member: Research and Development in North America
2. 284 Hybrid FRP-Concrete Structural Member: Research and Development in Europe and Asia
3. 087 Experiment on Flexural Behavior of Hybrid GFRP/ Concrete Bridge Deck
4. 319 Experimental study of GFRP-concrete hybrid beams
5. 115 In-Situ Load Tests and FE Modeling of Concrete Bridge Deck with FRP Stay-In-Place Forms
6. 120 Structural Performance Evaluation of Precast FRP-Concrete Composite Deck with Concrete Wedge for Cable-Stayed Bridge
7. 121 Static and Fatigue Behaviors of Precast FRP-Concrete Composite Deck for Cable-Stayed Bridge
8. 358 Experimental Studies on FRP-Concrete Composite Deck with FRP Perfobond Shear Connectors
9. 098 Numerical and experimental investigation of concrete-filled FRP tube
10. 265 An experimental investigation into the behaviour of filament wound hybrid FRP-concrete beam

## Smart FRP Structures

1. 289 Effectiveness of smart damper for hybrid FRP cable in long-span cable-stayed bridge
2. 034 A Smart FRP-Concrete Composite Beam using FBG Sensors
3. 250 Smart CFRP Systems – Fiber Bragg Gratings for Fiber Reinforced Polymers
4. 301 Sensor CFRP-Sheets for the controlled Strengthening and Retrofitting of Reinforced Concrete Members
5. 092 Strain and Health Monitoring of FRP Bridge Deck with an Electrically Conductive Nanocomposite Coating
6. 135 Smart Composites for Durable Infrastructures – Importance of Structural Health Monitoring (SHM)

## Concrete Structures Reinforced or Prestressed with FRP

1. 063 Experimental study on the tension stiffening effect of GFRP RC elements
2. 112 Behavior of High-Strength Concrete Beams Reinforced with Different Types of Flexural Reinforcements and Fibers
3. 226 Deflection Behaviour of Concrete Beams Reinforced with GFRP Bars
4. 151 Behaviour of continuous concrete beams reinforced with FRP bars
5. 227 Testing of Large-Scale Two-Way Concrete Slabs Reinforced with GFRP Bars
6. 295 Development Length of Glass Fiber Reinforced Plastic (GFRP)Steel Wire Composite Rebar
7. 312 Deformation Behavior of Concrete Two-Way Slabs Reinforced with FRP Bars Subjected to Eccentric Loading
8. 316 Experimental Study on the Flexural Behavior of Concrete Beam Hybrid Reinforced with FRP Bars and Steel Bars
9. 317 Study on the Flexural Capacity of Concrete Beam Hybrid Reinforced with FRP Bars and Steel Bars
10. 167 Experiments according to ETAG to determine friction effects on deviated CFRP-Strips
11. 281 Study of Static Load Tests of Bond-type Anchors for CFRP Tendons
12. 268 Bond Type Anchorage Systems for Permanent High Strength CFRP Ground Anchors
13. 352 Flexure-shear Analysis of Concrete Beam Reinforced with GFRP bars
14. 077 Effect of Bond Parameters on Recoverability of RC Bridge Columns Reinforced with Ordinary Rebars and Steel Fiber Composite Bars
15. 170 Effect of Reinforcement Detailing on the Behaviour of GFRP-RC Beam-Column Joints

## Long-Term Performance

1. 027 Interfacial Crack Growth Behavior On The RC Beams Strengthened With Prestressed FRP Under Cyclic Bending Loads
2. 029 Effects on the Fatigue Lives of RC Beams Strengthened with CFL at Elevated Temperature under Cyclic Bending Loads
3. 171 Fatigue loading effect on RC beams strengthened with externally bonded FRP
4. 175 Box girders under extreme long-time static and fatigue loading
5. 055 Experimental study of time-dependent behaviour of concrete members reinforced with GFRP bars
6. 093 Hygrothermal Ageing of Basalt Fiber Reinforced Epoxy Composites
7. 060 Moisture Diffusion in FRP Adhesively-Bonded Joints under Hot/Wet Environments
8. 089 Durability of FRP bonding systems under freeze-thaw cycling
9. 152 Bond Strength of Glass FRP Bars in Concrete Subjected to Freeze-Thaw Cycles and Sustained Loads
10. 118 Long-term durability of FRP cables under maritime conditions
11. 122 Temperature effects on full scale FRP bridge using innovative composite components
12. 149 Modeling the Effect of Repeated Loading on the Behavior of CFRP Confined Bond of Corroded Reinforcement
13. 168 Effects of accelerated ageing on the adhesive bond between concrete specimens and external CFRP reinforcements

## Fire, Impact and Blast Loading

1. 071 Glassy-rubbery transition behavior of epoxy resins used in FRP structural strengthening systems
2. 107 Fire Tests On RC Beams Strengthened With NSM
3. 123 Fire performance of water-cooled cellular GFRP columns
4. 169 Flexural and Punching Performances of FRP and Fiber Reinforced Concrete on Impact Loading
5. 183 Protection of Aged Cement Clinker Silo Against High Impact and High Temperature Discharge
6. 213 Nonlinear response of steel-fiber reinforced concrete beams under blast loading: material modeling and simulation
7. 243 Fire behavior of CFRP prestressed high strength concrete slabs
8. 326 Finite element modeling of insulated FRP-strengthened RC beams exposed to fire
9. 290 Effect of Fire and High Temperature on the Properties of Self Compacted Concrete

## Educations, Applications and Design Guidelines

1. 216 IIFC Educational Modules on Polymer Composites in Construction
2. 238 Challenges in the design and delivery of an online postgraduate course in fibre composites
3. 306 Virtual practice with computer aided software toward better understanding of RC beams strengthened by external bonded FRP
4. 025 Structural Remediation of Unreinforced Brick Masonry Walls of a Heritage Palace Building with Carbon Fibre Reinforced Polymers
5. 048 Inspection, analysis and loading test of a slab bridge strengthened with FRP laminates
6. 116 Structural Performance of Concrete Bridge Deck with Internal FRP Reinforcement
7. 161 Guidelines for Design of Honeycomb FRP Sandwich Panels
8. 163 Load bearing property of a FRP bridge after nine years exposure
9. 245 Cost Optimum Design of Structural Fibre Composite Sandwich Panel For Flooring Applications